

hail storm, lasting five minutes, occurred here; no serious damage resulted.

The "Charlotte (N. C.) Chronicle" of the 11th states that a hail storm occurred during the evening of the 10th between Charlotte and Columbia, S. C., along the line of the Charlotte, Columbia, and Augusta Railroad.

The "New York Times" of the 25th contains a report from Evansville, Vanderburg, Co., Ind., which states that a tornado passed through Vanderburg and Gibson counties on the afternoon of the 24th, causing much damage to buildings, etc.

A special dispatch to the "Missouri Republican" (Saint Louis) from Piedmont, Wayne Co., Mo., on the 19th, states that a tornado occurred near that place at 2.30 p. m. on the date mentioned. The path of the tornado is reported to have been about two hundred yards wide; it destroyed several buildings on the farms through which it passed. The course of the storm was from southwest to northeast for a distance of eight miles.

Between 4.30 and 5 o'clock on the afternoon of the 19th a tornado destroyed a large part of the town of Mount Vernon, Ill. (population about 8,000). Eighteen persons are reported to have been killed, and about three times that number were more or less seriously injured. About one hundred buildings were destroyed, among which was the county court-house, a

large and substantial structure of brick and stone. Concerning this storm the "Chicago Tribune" of the 22d states: "The starting point of the storm which devastated Mount Vernon seems to have been near the old town of Kaskaskia, Randolph Co., not far from the Chester Penitentiary. Heavy timber was mown down in this vicinity, and the house of John Bond was destroyed, and himself and wife injured. The force of the wind seems to have 'scattered' as it passed in a northeasterly direction, and, while it did some damage at Steeleville, Randolph Co., and left a trail across Perry County, the damage was confined to wrecked buildings, no loss of life having been reported. Passing between Duquoin and Pinckneyville the storm turned due northeast, concentrated its energies, and swept upon Mount Vernon with the result the dispatches have outlined. No great amount of damage was done beyond Mount Vernon."

Rockford, Ohio Co., Ky.: reports from Mason's Landing, on Green River, state that during the evening of the 19th a storm destroyed a number of buildings in that vicinity, entailing losses amounting to several thousand dollars.

Wilkesbarre, Pa.: a number of buildings were unroofed and trees blown down during a violent storm which occurred here on the morning of the 25th.

## INLAND NAVIGATION.

### STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations, the highest and lowest depths for February 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, February, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La. ....	29.9	19, 20	20.6	4	18.8	1.8
Arkansas River:						
Port Smith, Ark. ....	22.0	5	9.2	20-23	3.4	5.8
Little Rock, Ark. ....	23.0	8	10.5	25	3.2	7.3
Missouri River:						
Omaha, Nebr. ....	18.0					
Leavenworth, Kans. ....	20.0	20, 24	9.5†	28	7.4†	1.1
Mississippi River:						
Saint Paul, Minn. ....	14.5					
La Crosse, Wis. ....	24.0					
Dubuque, Iowa. ....	16.0					
Davenport, Iowa. ....	15.0					
Keokuk, Iowa. ....	14.0					
Saint Louis, Mo. ....	32.0	26	15.4	18, 19	8.5	8.5
Osage, Ill. ....	40.0	28	28.9	3, 4	17.8	11.1
Memphis, Tenn. ....	34.0	29	23.0	6	13.8	9.2
Vicksburg, Miss. ....	41.0	1	24.8	9	19.7	5.1
New Orleans, La. ....	13.0	3, 24	8.9	12	7.3	1.6
Ohio River:						
Pittsburg, Pa. ....	22.0	27	10.6	1	2.6	8.0
Cincinnati, Ohio. ....	50.0	16	27.1	3	8.5	18.6
Louisville, Ky. ....	25.0	15, 16, 17	10.7	3, 4	5.8	4.9
Cumberland River:						
Nashville, Tenn. ....	40.0	15	18.1	3, 4	8.6	9.5
Tennessee River:						
Knoxville, Tenn. ....		11, 12	5.0	3	2.4	2.6
Chattanooga, Tenn. ....	33.0	13, 26	11.2	3	5.2	6.0
Monongahela River:						
Pittsburg, Pa. ....	29.0	27	10.6	1	2.6	8.0
Savannah River:						
Augusta, Ga. ....	32.0	26	29.0	3	8.1	20.9
Sacramento River:						
Red Bluff, Cal. ....		1	14.5	28, 29	2.4	12.1
Sacramento, Cal. ....		16	20.0	1	15.2	4.8
Willamette River:						
Portland, Oregon. ....		1	16.6	24, 25	3.5	13.1

\* River frozen entire month.

† Record for last 10 days only.

### ICE IN RIVERS AND HARBORS.

Passamaquoddy Bay.—Eastport, Me.: floating ice in bay on the 19th.

Penobscot Bay.—The "Portland (Me.) Press" of the 15th contained the following:

Rockland, February 14.—The ice which has closed up the harbors in this section since February 1st, started to-day. In the harbor, its departure was the cause of much excitement. It started here about noon, going out with the wind. The immense field of ice occupying the space from Owl's Head to

Tillson's wharf, twelve to eighteen inches thick, started in a sheet and swung out in a body, taking all the fleet of vessels in winter quarters here that lay in its wake.

Portland Harbor.—Portland, Me.: the harbor was completely covered with ice from the 1st to 5th and 10th, and partially covered with ice on the 6th, 8th, 9th, 12th to 15th; floating ice in harbor on the 11th, 15th to 18th; ice disappeared rapidly on the 20th.

Boston Harbor.—Boston, Mass.: harbor froze over on 1st; ice broke up on 3d.

Wood's Holl Harbor.—Wood's Holl, Mass.: ice in harbor disappeared on the 14th.

Edgartown Harbor.—Edgartown, Mass.: navigation was suspended from 1st to 4th, and resumed on 5th; drift ice in harbor on the 11th.

Nantucket Harbor.—Nantucket, Mass.: ice was broken up by steamers and harbor cleared on 5th.

New London Harbor.—New London, Conn., 1st: many vessels which have come into harbor during the past two weeks are remaining on account of the harbors at other places being closed by ice. Floating ice in harbor on the 7th.

New Haven Bay.—New Haven, Conn.: the ice began to move out of harbor on the 14th.

East River.—New York City: floating ice on 29th.

Delaware River.—Port Jervis, N. Y.: the river was gorged for a distance of four miles on the 23d; the back-water flooded cellars and basements.

Bordentown, N. J.: large quantities of drift ice passed down the river on the 25th.

Philadelphia, Pa.: floating ice on the 2d.

Susquehanna River.—Port Deposit, Md.: the ice dam in the river at Garrett Island broke during the morning of the 25th.

Chesapeake Bay.—Baltimore, Md.: large quantities of floating ice were encountered on the 13th in the upper bay, causing considerable inconvenience to vessels.

Alleghany and Monongahela rivers.—Pittsburg, Pa.: floating ice in both rivers, 5th to 10th, 15th, and in Alleghany River 11th, 12th, 21st to 23d, 25th, 27th to 29th.

Genesee River.—Rochester, N. Y.: ice moved out of portions of river on the 23d.

Lake Erie.—Buffalo, N. Y.: the high winds of the 20th, 21st, and 25th broke up the ice in the lake.

Presque Isle Bay.—Erie, Pa.: the ice in the bay was twenty inches thick on the 16th.

*Cuyahoga River.*—Cleveland, Ohio: ice moved out of the river on the 20th.

*Saint Clair River.*—Port Huron, Mich.: floating ice on 5th, 6th, and 26th.

*Grand River.*—Grand Haven, Mich.: the river froze over on the 7th.

*Saint Joseph River.*—Mottville, Mich.: the ice moved out of the river on the 22d.

*Lake Michigan.*—Grand Haven, Mich.: vessels were inclosed by ice off this harbor on the 9th and 10th; on 12th the lake was frozen for a distance of forty miles from the shore; heavy slush ice blockaded entrance to harbor on the 29th.

Milwaukee, Wis.: at the close of the month the lake was almost covered with ice, and the strong westerly gales had packed it in large quantities along the east shore. Fields of ice from ten to twelve feet thick, interfering greatly with navigation, were reported off Ludington, Mich. The five steamers which ply between Milwaukee, Grand Haven, and Ludington were for eight days unable to enter either harbor or to get within eight miles of the east shore.

*Ohio River.*—Louisville, Ky.: the river was almost clear of ice at noon of the 5th.

*Mississippi River.*—Cairo, Ill.: the steamers "Dakota" and "Norton" left for Saint Louis on the 3d, being the first departure since closing of navigation, and the "City of Saint Louis" the first boat to arrive on the 5th. There was floating ice from the 1st to 17th, on account of which navigation was suspended on the 10th.

Keokuk, Iowa: the ice moved slightly during the night of the 22d; the river was still frozen at end of month.

*Des Moines River.*—Keokuk, Iowa: ice broke up and moved out of river on the 21st.

*Embaras River.*—Charleston, Coles Co., Ill.: ice in river, three miles and a half east of this place, broke and moved down the stream on the 20th.

*Missouri River.*—Fort Buford, Dak.: the river at this place remained almost entirely frozen throughout the month, with slowly rising water.

Leavenworth, Kans.: the ice in the river broke up and moved out on the 19th, navigation having been closed since December 20, 1887. Floating ice on the 23d.

#### FLOODS.

Lawrence, Douglas Co., Kans.: a sudden rise occurred in the Kansas River at this place on the 20th, which resulted in the washing away of the machinery, valued at several thousand dollars, at the Bowersock's mill.

Norwich, Conn.: the heavy rain of the 20th caused a breaking up of the ice, after which the river rose rapidly and overflowed some of the lower streets.

New Haven, Conn.: the dam of the Fountain Water Com-

pany, at West Ansonia, New Haven County, gave way during the night of the 20th-21st, flooding the valley.

Palmer, Hampden Co., Mass.: a very destructive freshet occurred here during the night of the 20th-21st. The lowlands were flooded for miles to depths reaching ten feet. Numerous dwellings were flooded and many outbuildings and bridges were washed away.

Springfield, Mass.: at Chicopee, in this county (Hampden), on the 21st, the dam of the Dwight Company was carried away by the freshet resulting from the giving away of the ice dam in the Chicopee River.

Fremont, Sandusky Co., Ohio: the lowlands adjacent to the Sandusky River were flooded on the 21st.

Augusta, Me.: the heavy rains of the 21st-22d caused the flooding of basements and cellars of many houses in this city.

Galveston, Tex.: more than three inches of rain fell here in one hour (9.30 to 10.30 a. m.) on the 22d. The capacity of the sewers of the city was not sufficient to carry off the heavy fall of water and consequently the streets were flooded. This was the heaviest rainfall that has occurred since November 2, 1873, when 3.50 inches fell in thirty minutes.

Montgomery, Ala.: the heavy rainfall of the 23d caused the rivers in this vicinity to rise considerably. On the 26th the lowlands opposite this place were inundated.

New Orleans, La.: nearly four inches of rain fell during the storm of the 23d-24th, resulting in the flooding of a considerable area near the city.

Charlotte, N. C.: the heavy rainfall of the 24th caused the streams in this section to overflow. The streets in Charlotte were inundated in some places.

Fort Maginnis, Mont.: the Missouri River at Rocky Point and Gulpin, about sixty miles from this place, rose ten and a half feet on the 24th, and small creeks overflowed.

Augusta, Ga.: the unusually rapid rise in the Savannah River, which occurred from the 24th to the 26th, culminated in an overflow of the river plantations on the last mentioned date. The telegraphic flood warnings, however, which were sent out by the Chief Signal Officer, on the 21st, enabled the planters to remove their farming implements and stock to safe places.

Bordentown, Burlington Co., N. J., 25th: during the past few days the Delaware River has swollen so as to overflow the lowlands on the Pennsylvania side.

#### HIGH TIDES.

Eastport, Me., 14th and 28th; Southport, N. C., 10th; Fort Canby, Wash., 12th.

Onancock, Accomac Co., Va.: during the high southeast winds on the 27th the tide in Onancock Creek rose seven feet above high-water mark, a height within a few inches of that of the very high water of 1877. The tide came up suddenly and soon subsided.

### ATMOSPHERIC ELECTRICITY.

#### AUORAS.

The most notable auroral display of the month was that of the 8th, which was observed from eastern Montana to the New England coast, and as far southward as the forty-second parallel. Although this display was extensively observed, it does not appear to have been especially brilliant and, so far as reports at hand show, it had no appreciable influence upon the telegraph lines, etc., as is commonly noted during an extended display. Concerning this display, the following notes from the daily journals of observers are given:

Bismarck, Dak., 8th: an auroral arch extended over 75° of the northern horizon and to an altitude of 40° from 10 p. m. until midnight; color, pale yellow.

Fort Totten, Dak., 8th: faint aurora from 8.30 p. m. until midnight, after which time the display became brilliant and lasted until 5.30 a. m. of 9th.

Saint Vincent, Minn., 8th: an aurora appeared at 9 p. m. and continued until 7 a. m. of the 9th; the display consisted of a segment of white light; altitude 12°; azimuth 135°.

Saint Paul, Minn., 8th: auroral light from 11.25 p. m., extending from 165° to 210° azimuth and to 25° altitude at centre, with two streamers reaching upward 43°; these streamers were most of the time pale, but they occasionally attained considerable brilliancy.

Green Bay, Wis., 8th: a faint aurora appeared during the night; it was first seen at 10.10 p. m. in the form of an arch, altitude about 20°, azimuth from 95° to 265°; at 11 p. m. the display was the same as when first seen.

Mackinaw City, Mich., 8th: aurora was observed at 8.40 p. m., as a luminous band, through which the stars were seen; the arch reached an altitude of 25° and covered one hundred and five degrees of the horizon; beneath the arch was a dark segment of 10° altitude.

Erie, Pa., 8th: a faint aurora was observed at 10 p. m.; azimuth 20°, altitude 10°.

Lyons, N. Y., 8th: a diffuse aurora was observed throughout the evening of the 8th.

Manchester, N. H., 8th: an aurora was observed from 9.15 p. m. until 10.40 p. m., consisting of a broad, low arch of bright straw color, extending from about 140° to 220° azimuth, with a dark segment beneath; there were no streamers or flashes, but a steady bright light which reached its greatest brilliancy at 9.45 p. m.